

EMERGENT LEADERSHIP BEHAVIORS: THE FUNCTION OF PERSONALITY AND COGNITIVE ABILITY IN DETERMINING TEAMWORK PERFORMANCE AND KSAS

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ABSTRACT: This study investigated the theoretical underpinnings of individual differences in emergent leadership behaviors and their relationships to teamwork processes and outcomes. Both personality and cognitive ability were utilized to examine behaviors of leadership emergence, team performance, and KSAs. Three hundred and twenty undergraduate psychology students completed personality and cognitive ability tests and then formed sixty-seven mixed-gender teams. Members rated each other on emergent leadership behaviors as well as their team on specific interpersonal and self-management KSAs. Results revealed that extroversion, openness to experience and cognitive ability were predictive of emergent leadership behaviors. Conscientiousness and cognitive ability were associated with team performance. Implications and future directions for research are discussed.

One implicit assumption in organizational and group research is that leaders play an integral part in modeling teamwork and setting priorities for team members to successfully engage in teamwork processes and outcomes (see Guzzo & Salas, 1995; Bass, 1990; House & Baetz, 1979, for examples and reviews). During the last decade, there has been a significant increase in the scope of inquiry and variety of methodologies to understand leadership as a process which influences the effective and

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efficient functioning of a team within an organization (Yukl, 1990). Leadership has implications for developing commitment and increasing compliance in task behavior, influencing group maintenance and identification, and influencing the culture and climate of an organization (Guzzo & Salas, 1995; Bass, 1990).

Trends are beginning to emerge in leadership research. One of these emerging trends is the relationship between personality traits and emergent leadership (Kenny & Zaccaro, 1983; Lord, DeVader, & Allinger, 1986). Researchers have expressed the usefulness of viewing leadership as a dynamic social process and examining how certain individuals become emergent leaders in an interacting team. The focus for the current study is the use of personality and cognitive ability in determining emergent leader behavior. In addition, we also attempt to find certain personality traits as well as the cognitive ability of the emergent leader that are important in predicting the performance and knowledge, skills, and abilities (KSAs) of a team.

Most of the empirical studies on perceptions of emergent leadership have concentrated on the behavior of group members and the amount of social interaction of these individuals. For example, research has demonstrated that the quantity of verbal interaction is strongly related to perceptions of emergent leadership (Sorrentino & Boutillier, 1975; Morris & Hackman, 1969; Lord, 1977). However, current research has included broader definitions and characteristics of emergent leaders (Bass, 1990; Guzzo & Salas, 1995). Because of their initiative, interaction, and contributions to the team's task, emergent leaders have been characterized as those individuals that establish conditions that will promote the movement toward accomplishment of goals and objectives, increase members' freedom and acceptance, and assist in developing a cohesive team (Bass, 1990). In addition, emergent leaders function in organizations as individuals that assume leadership responsibilities in leaderless groups (e.g., autonomous work teams, informal meetings, and social networks; Bass, 1990; Guzzo & Salas, 1995). Perceptions of emergent leadership have received considerably less research attention than perceptions of leaders with "legitimate" authority (i.e., elected or appointed leaders).

Recent reviews (e.g., Lord et al., 1986; Kenny & Zaccaro, 1983) have emphasized the theoretical and methodological ramifications for considering the role that personality traits have on the tendency of a leader to emerge in a team setting. In these reviews, it is asserted that many researchers (e.g., Mann, 1959; Stogdill, 1948; 1974) have overgeneralized their findings on personality and *leadership emergence* to the issue of personality and the *quality of a team's performance*. These researchers have assumed that the personality traits associated with leadership emergence can be extended to also include the criterion measure of teamwork performance. It has been suggested (Lord et al., 1986) that the search to

discover the keys to emergent leadership should focus on distinguishing both the specific personality traits that would distinguish leaders from followers and also those traits that would generally predict the overall effectiveness of a leader's work team.

Specifically, association of some of the personality traits with emergent leadership behaviors in these team does not necessarily imply that these traits would predict the overall effectiveness of a work team. For instance, the trait of extroversion may predict the perception of which individual emerges as leader and *not* teamwork effectiveness, whereas the trait of conscientiousness may predict *both* the emergence of leadership *and* the effectiveness of the work team.

Aside from specific personality traits, emergent leaders in work teams must also have the essential knowledge and cognitive ability that comprise the intellectual skills necessary for a work team to succeed and operate effectively (Guzzo & Salas, 1995; Bass, 1990). There is substantial evidence (Lord et al., 1986; Ghiselli, 1971; Heslin, 1964) that an individual's ability to contribute to the achievement of group goals and objectives is a characteristic associated with leader emergence *and* work team effectiveness. This contribution is largely determined by the leader's intellectual, interpersonal, and administrative competence (Guzzo & Salas, 1995; Lord & Hall, 1992).

This study investigated the theoretical underpinnings of individual differences in emergent leadership behaviors and their relationships to teamwork effectiveness in a laboratory setting. Of particular interest were three issues that clarify and advance the research within the domain of emergent leadership behaviors. These issues addressed the perception of the behaviors of emergent leaders and the relative contributions of personality and cognitive ability in determining team performance and competencies.

First, relationships between emergent leader behaviors and personality traits were investigated. In addition to personality, the relationship of cognitive ability with emergent leadership was also examined. Secondly, because of the overgeneralization of findings on personality and leadership emergence to the relationship of personality to teamwork effectiveness, this study investigated personality traits of the emergent leader and their relationship to team performance and KSAs. Besides this objective measure, the KSAs that are relevant to the productive functioning of a work team were also assessed (Stevens & Campion, 1994). These KSAs encompass both the social and task requirements that are necessary in predicting team-related aspects of work performance. For example, the dimensions of collaborative problem solving, conflict management, and communication consisted of social or interpersonal KSAs while performance management and planning and coordinating consisted of the task or self-management KSAs. Finally, the third issue examined in this study

was whether personality traits *augment* cognitive ability in determining teamwork performance and KSAs. Dimensions of personality are relatively independent of measures of cognitive ability (McCrae & Costa, 1987). Although past research has examined both personality and cognitive ability of emergent leaders, none have examined whether certain personality constructs have an effect beyond cognitive ability in predicting measures of teamwork effectiveness.

EMERGENT LEADERSHIP BEHAVIOR IN TEAMS

This review describes the conceptual framework and empirical findings in the area of emergent leadership. Concepts and research questions are posed that are utilized to clarify and extend the three issues related to leadership emergence: the personality traits and cognitive ability of emergent leaders, the relationship between personality traits of the emerging leader and team performance and KSAs, and the role of personality in augmenting cognitive ability in predicting team performance and KSAs.

Personality Traits and Cognitive Ability of Emergent Leadership Behaviors

Based on his review, Stogdill (1948) concluded that five traits differentiated existing leaders from followers. The five traits were intelligence, dominance, self-confidence, level of energy and activity, and task-relevant knowledge. However, these five traits did not accurately predict which individuals became leaders in organizations. Stogdill contended that people with these traits often remained followers. He concluded that individual traits interact with situational cues so that it is unlikely that many leader traits will be consistently associated with leader emergence or effectiveness across a variety of widely differing situations.

In addition to Stogdill's (1948) conclusions, Mann's (1959) review was similarly disappointing for trait theorists. Among the seven categories of traits he examined, Mann found intelligence or cognitive ability was the best predictor of leadership. However, Mann warned that all observed positive relationships between traits and leadership were weak (correlations averaged .15). Together, Stogdill's and Mann's reviews concluded that personality variables account for only a minor proportion of variance in leadership behavior. In essence, their reviews failed to support the fundamental assumption of the trait approach by posing the limitation that a leader with certain traits could be successful in one situation but unsuccessful in another situation. In making this assertion, Stogdill and Mann paved the way for the growth in popularity of contingency ap-

proaches to leadership which posit that different settings require different types of leadership.

However, there are a number of reasons why a cautious reinterpretation of Stogdill's and Mann's reviews is required (Lord et al., 1986). First, the studies they reviewed were predominately concerned with the behavior of children. Results of these studies may not generalize to the behavior of adult leaders in formal organizations. Secondly, few of these studies looked at the "effectiveness" of the leaders. The focus was more upon which persons emerged as leaders, not on the overall performance of a particular group. Finally, by treating each of the correlations between a trait and leadership as a separate observation, Mann makes unwarranted statistical assumptions since predictor ratings derived from the same source may be spuriously intercorrelated (Lord et al., 1986).

Moreover, Kenny and Zaccaro (1983) contend that past trait data may have been incorrectly analyzed. Both authors posit that the research and measurement strategies were inadequate in analyzing personality traits of leaders. By applying statistical techniques to a previous database, they demonstrated that the majority of a leader's behavior could be ascribed to stable underlying traits. Their analysis suggested that between 49% and 82% of leadership variance could be attributed to personality qualities or traits. However, one particular shortcoming in their methodology was that they were unable to determine specific traits associated with emergent leadership.

A 1986 meta-analysis by Lord and his associates remedied these methodological problems. Besides criticizing the lack of methodological rigor of Stogdill's and Mann's findings, Lord et al. (1986) found that the correlations between traits and perceived leadership ability were misinterpreted as linkages between traits and work team effectiveness. In an analysis of Mann's data and other subsequent studies, Lord et al. (1986) found that individuals tend to be perceived or emerge as leaders when they possess one or more of the following traits: intelligence (cognitive ability), dominance, and masculinity.

Although personality has been employed mainly in predicting job performance, it can be utilized as a predictor of emergent leadership behavior in work teams. The traits of intelligence or cognitive ability, dominance, masculinity, and sociability (Lord et al., 1986; Kaess, Witryol, & Nolan, 1961) have been associated with emergent leadership. For instance, some of the personality traits and the prototypical characteristics of extroversion and openness to experience may be significant predictors of the emergent leader in certain work group settings.

The following describes specific past research on personality and leadership and emergent leader behavior that suggests relationships between the two constructs. Considerable research has shown extroversion to be related to emergent leader behavior. McCauley (1990) suggests

that extroverts are sociable and communication-oriented, placing these members in more dominant group positions. Bass, McGehee, Hawkins, Young, and Gebel (1953) found relationships between leadership and high energy levels and sociability on the Rorschach Test and the Guilford-Zimmerman Temperament Survey. Finally, Campbell and Van Velsor (1985) suggest that emergent leaders in leaderless group discussions are outgoing and extroverted.

Additional research suggests an openness to experience-emergent leader behavior relationship. Emergent leaders are willing to conceptualize novel approaches to problem solutions and also demonstrate autonomy in this process. Bass (1954) suggests that participants in unstructured, ambiguous situations who create plans for directing others toward a problem solution will be rated as emergent leaders. Morris and Hackman (1969) found that emergent leaders were those individuals who displayed more initiation of ideas, expressed more opinions, and asked more questions than the followers within the group. To summarize, we find considerable research support to suggest that extroversion, openness to experience, and cognitive ability will be related to emergent leader behavior in a team situation.

Hypothesis 1: Cognitive Ability, extroversion, and openness to experience will predict emergent leadership behavior within a team setting.

The Relationship Between Personality Traits, Team Performance, and KSAs

As discussed earlier, one of the criticisms of early trait research is an overgeneralization of findings on personality and emergent leader behavior to research on personality effects on work team effectiveness (Lord et al., 1986). Though Mann (1959) mentions performance, the relationships he investigated were between personality and attained leadership status as indexed by peer ratings, observer rating, or by group nomination. None of the studies he reviewed used group task performance or team effectiveness as dependent variables. Research on leadership has maintained a negative view of the relationship between personality traits and work team performance. For example, Muchinsky (1983) noted that there is "little or no connection between personality traits and leader effectiveness" (p. 83), and Landy (1985) contended there is "no relationship between personality factors and leadership effectiveness" (p. 34).

However, a review of the literature indicates there may be personality traits that could consistently predict team performance as well as emergent leader behavior. In an early study, Heslin (1964) built upon Mann's (1959) review by focusing on group or team performance as the dependent variable. He found a leader's emotional adjustment to be strongly and

consistently related to teamwork performance. McClelland and Boyatzis (1982) have shown that differences in the need for power and need for affiliation can predict managerial success up to 16 years later. Moreover, House (1988) concluded that personality traits can and often do have significant relationships to important criterion variables such as measures of teamwork performance.

A similar proposition may be extended to predict current standards of team effectiveness. Earlier studies characteristically focused on the performance of individuals and did not address the measurement of teamwork skills (Salas, Blaiwes, Reynolds, Glickman, & Morgan, 1985). Dyer (1984) posited that many team process measures are not only unreliable, complex, and insensitive, but also measure irrelevant variables. However, because modern task demands in organizations are likely to exceed the capabilities of single individuals, there has been a great deal of research attention (i.e., Guzzo & Salas, 1995; Salas et al., 1985) in measuring teamwork effectiveness. Part of this research attention (Stevens & Campion, 1994) has focused on the development of theoretically based, psychometrically sound, and practically useful indicators of teamwork.

According to Stevens and Campion (1994), there are two critical dimensions for increasing the overall effectiveness of a work team (see Table 1). These two dimensions encompass both interpersonal and self-management areas. The interpersonal area includes conflict resolution, collaborative problem solving, and communication. The self-management area includes performance management, and planning and coordinating. For each of these dimensions, there are specific knowledge, skills, and abilities (KSAs) that are essential to the productive functioning of a work team.

Therefore, it would be useful to examine whether these dimensions are related to the personality traits associated with emergent leadership. That is, there may be certain personality traits that are more effective in increasing team-based KSAs. To illustrate, the personality traits of extroversion and openness to experience may be related to the interpersonal teamwork KSAs. Previously we provided theoretical justification relating extroversion and openness to experience to emergent leader behaviors. Team members who demonstrate the behaviors embodied in these traits should be effective at encouraging peers to work together to accomplish goals. Extroversion measures traits that are interpersonal in nature and that relate to the quality of social interaction (McCrae & Costa, 1989). Extroverts are also warm, enthusiastic, outgoing, and friendly (McCrae & Costa, 1992). In group situations extroverts will exhibit leader behaviors, actively participate in group discussions, and are considered popular with peers (Littlepage, Schmidt, Whistler, & Frost, 1995). As a result, extroverts will be positioned to model leader behaviors, which will encourage the accomplishment of interpersonal KSAs such as conflict resolution

Table 1
Team KSA Dimensions

Dimension	Teamwork Areas	KSAs
Interpersonal Areas	Conflict Resolution	The team avoided unnecessary confrontation, was constructive, civil, and not personally threatening, and attempted to find solution that satisfied all parties.
	Collaborative Problem Solving	Team members took the initiative toward problem solving, considered the contributions of all team members, and participated in group decision making.
	Communication	Team members gave suggestions, communicated effectively, shared information, listened carefully, gave everyone the opportunity to speak, communicated ideas clearly, and accepted criticism graciously.
Self-Management Areas	Performance Management	The team suggested appropriate and attainable goals, was aware of progress toward group goals, made sure everyone contributed, encouraged members, and gave members feedback on their performance.
	Planning and Coordinating	The team performed tasks quickly and proficiently, and was unobstructive. Team members assisted others in accomplishing their responsibility, assessed individuals' strengths and weaknesses, and assigned tasks according to ability.

and communication. Open individuals have a preference for variety, are intellectually curious, and demonstrate independence of judgment (McCrae & Costa, 1987). In addition, openness is related to divergent and novel thinking, creativity, and curiosity. These traits identify individuals who the group would see as providing unique insight in problem solving situations, such as those identified by Stevens and Campion's (1994) KSA of collaborative problem solving.

Hypothesis 2A: Extroversion and openness to experience of the emergent leader will be associated with the team's interpersonal KSAs.

In addition to extroversion and openness to experience, the personality trait of conscientiousness should be related to the accomplishment of self-management team KSAs. Group members scoring high on conscientiousness should be achievement oriented and inclined to strive for successful task accomplishment (Zander & Forward, 1968). The social behavior of conscientious individuals tends to be more task oriented than emotionally motivated. As a result, relatively conscientious individuals will have an impact on the effectiveness of the group as a result of their focus on task relevant inputs.

Hypothesis 2B: Conscientiousness of the emergent leader will be associated with the team's performance and self-management KSAs.

*The Role of Personality in Augmenting Cognitive Ability
in Predicting Team Performance and KSAs*

The emergent leader's cognitive ability is a factor in the overall performance of the work team. For leaders to be productive, they must gather, integrate, and interpret enormous amounts of information, especially with the rapid technological changes/complexity and increased competition in virtually every industry. Thus, it is not surprising that leaders need to be competent to formulate suitable strategies, solve problems, and make correct decisions. Kirkpatrick and Locke (1991) state that a "keen mind" (i.e., strong analytical ability, good judgment, and the capacity to think strategically and multidimensionally) is necessary for effective leadership.

Other research has also focused on the importance of cognitive ability for the emergent leader. In addition to finding emotional adjustment related to teamwork performance, Heslin (1964) found intelligence to be significantly related to the effectiveness of the team. A similar finding was verified by Ghiselli (1971) in which cognitive ability and supervisory ability predicted group performance. Finally, Lord and Hall (1992) posit that higher cognitive ability in a leader leads to greater capacity to process information in the analytical, controlled mode necessary to facilitate organizational decision making. Lord and Hall (1992) proposed that, to the degree that an organization relies on rational information processing, team performance is related to the cognitive ability of the emergent leader.

Although some research has investigated both the personality and cognitive ability of emergent leader behaviors, no research has examined whether personality traits of emergent leaders supplement cognitive ability in affecting the overall performance of a work team. Moreover, another issue to examine is whether certain personality constructs can predict team-based KSAs above and beyond the cognitive ability of the emergent leader. There may be certain emergent leader personality traits that can have an effect beyond cognitive ability in accounting for the variance in teamwork KSAs. Such an analysis is possible because the dimensions of

the five-factor personality structure are relatively independent of measures of cognitive ability (McCrae & Costa, 1987).

Hypothesis 3A: Conscientiousness of the emergent leader will have an effect beyond cognitive ability in accounting for the variance in the team's performance and self-management KSAs.

Hypothesis 3B: Extroversion and openness to experience of the emergent leader will have an effect beyond cognitive ability in accounting for the variance in the team's interpersonal KSAs.

METHOD

Participants and Procedure

Participants were 320 male and female volunteers enrolled in an undergraduate psychology course at a large, Midwestern university. Individuals participated in groups of four to six for a total of sixty-seven mixed-gender teams. Of the original 320 participants, 16 were not included in the data analyses due to missing data; missing data appeared to be randomly scattered over groups and predictors.

Participants were told that the study examined the relationship between personality characteristics and teamwork effectiveness. In the first part of the study, a number of tests were administered to assess participant personality and cognitive ability. After finishing the first part of the study, participants took part in a "Winter Survival Simulation" as described in Johnson and Johnson (1986). This type of exercise has been used in previous emergent leadership behavior research (Sorrentino & Field, 1986; Craig & Sherif, 1986; Geis, Boston, & Hoffman, 1985; Sorrentino, 1973). In this simulation, teams rank a list of materials in the order of importance for survival.

When participants finished the simulation, they completed questionnaires to measure emergent leadership and teamwork KSAs. The questionnaires pertained to each team member's perception of other members' contribution towards the achievement of teamwork skills and competencies. Participants were asked to examine the interpersonal dynamics among the team members. Upon completion of these questionnaires, participants were debriefed that their overall group performance was based on the team rank-ordering of the items.

Team Exercise: Winter Survival Simulation

The "Winter Survival Simulation" (Johnson & Johnson, 1986) examines how team members form and determine decisions that are critical

to their performance and survival. It allows team members to analyze the rational and intellectual abilities of other individuals in their team, as well as to observe the social or relational skills of others while interacting in this problem solving task (Lafferty, 1987).

In this simulation, team members were told that their plane has crash-landed in the woods of northern Minnesota and southern Manitoba during the winter. After they were given several details that are critical to their survival, team members were informed that several members of their group have salvaged 15 items. The team's task was to rank these items according to their importance to their survival, starting with '1' for the most important item and ending with '15' for the least important item. Members were also told that they may assume that the number of passengers is the same as of number of persons in their team, and that the group has agreed to stick together.

MATERIALS

Personality

Goldberg's Adjective Checklist (Goldberg, 1992) was used to assess the personality dimensions of group members used in this study. This checklist was devised to operationalize the five-factor model of personality posited by Digman (1990) and McCrae and Costa (1985) and consists of 50 adjectives describing the five domains. Participants used a 9-point Likert scale to rate each of the adjectives (1 = Not at all true of me; 3 = Partly true of me; 5 = Moderately true of me; 7 = Very true of me; 9 = Extremely true of me). Internal consistencies (Cronbach's alpha) of the scales used in this study are as follows: extroversion ($\alpha = .85$); conscientiousness ($\alpha = .78$); and openness to experience ($\alpha = .71$). All of the reliabilities of these measures administered were all over the .70 minimum guideline established by Nunnally (1978).

Cognitive Ability

Thurstone's Test of Mental Alertness (Thurstone & Thurstone, 1989) was administered to assess cognitive ability. Thurstone's Test of Mental Alertness measures the capacity to acquire knowledge and skills, and to transfer these to problem solving. Test items are arranged both in order of increasing difficulty and in a fixed, repetitive pattern alternating verbal and quantitative content. Together the verbal and quantitative content has a test-retest reliability ranging from .84 to .95 (Thurstone & Thurstone, 1989). For purposes of this study, the verbal and quantitative scores were combined to form a composite of cognitive ability.

Leadership Emergence

After completing the "Winter Survival Simulation," participants were given two questionnaires to measure emergent leadership. The first questionnaire was developed from the team dimensions mentioned by Stevens and Campion (1994) and is similar to the team leadership descriptions discussed by other researchers (Guzzo & Salas, 1995; Lord, Phillips, & Rush, 1980; Lord, 1977). These dimensions include both interpersonal and self-management behaviors that are essential to the functioning of the work team. The interpersonal dimensions include conflict resolution, collaborative problem solving, and communication, whereas the self-management dimensions include performance management, and planning and coordinating.

Although these specific behaviors have not been traditionally used in emergent leadership experiments, previous research (Guzzo & Salas, 1995; Lord et al., 1980; Lord, 1977) has employed similar dimensions that assesses task-related leadership behavior (i.e., developing orientation and defining problems, facilitating information exchange, developing plans, coordinating or directing behavior, and facilitating evaluation and analysis) and socioemotionally related leadership behavior (i.e., enhancing task motivation, reducing or avoiding conflict, and developing a positive group atmosphere). Additionally, all of these dimensions are also based on specific team-based competencies required from all individuals for an effective and productive work group.

This type of leadership emergence was assessed by member ratings of other team members on Stevens and Campion's (1994) dimensions using the relative percentile method (RPM; Goffin, Gellatly, Paunonen, Jackson, & Meyer, 1996). In this method, participants rate their team members on each of the five dimensions by comparing them to other team members that the participants have worked with in the past. Participants were informed that this method of rating is based on percentages (ranging from 0 to 100). A typical team member of average effectiveness should be situated in the middle of the scale and would receive a "percentile rank" of 50. All responses to each team member were combined across the five dimensions to form an aggregate score of emergent leadership for this specific questionnaire.

In conjunction with this questionnaire, the Behavior Description Questionnaire (BDQ) by Morris and Hackman (1969) was also employed. This 8-item measure assesses the initiation of structure (Halpin & Winer, 1957) or task-related behaviors of the leader. Morris and Hackman contend that emergent leaders are heavy contributors to the interactions that take place in their groups. They display more initiation of ideas, express more opinions, and asked more questions than do members who

do not emerge as leaders. Participants were told to rate how descriptive each statement is of each member using a 7-point Likert scale (1 = Not at all descriptive; 4 = Moderately descriptive; 7 = Very descriptive). All ratings of each team member in this questionnaire were combined to form a composite score for each member of the group.

The correlation between the Stevens and Campion's (1994) scale and Morris and Hackman's (1969) scale was .71. Both of the scores on the two questionnaires were then standardized and combined into one overall score for emergent leadership. The individual who was seen as displaying all of these competencies and skills in a team atmosphere and setting and had the highest combined rating score was designated as the emergent leader.

Team Performance

Team performance was objectively assessed by how well the team ranked-ordered each of the items in the "Winter Survival Simulation." For each team, the absolute difference between the correct ranking of each item and the team's ranking was measured, and the differences for each of the 15 items were summed to provide a team performance score. Lower team performance scores therefore described more effective teams.

Teamwork KSAs

Participants were administered a questionnaire to measure perceptions of teamwork KSAs. This teamwork KSA scale consists of 14 items that assesses the two broad dimensions discussed by Stevens and Campion (1994). However, in measuring teamwork KSAs, the level of analysis was at the group level, not the individual level as in emergent leadership behaviors. Participants were asked to rate their team on how descriptive each statement is of how their team worked together on a 7-point Likert scale (1 = Not at all descriptive; 4 = Moderately descriptive; 7 = Very descriptive).

Principal factors extraction with oblique rotation was performed on the items in the scale (as shown in Table 2). Since the items were correlated with each other, factors were rotated without imposing the orthogonality condition. Two factors were extracted and were labeled interpersonal and self-management KSAs. Specific items were then chosen from the loadings on these two factors to form measures of these KSAs. Comrey (1973) suggests that loadings in excess of .71 (50% overlapping variance) are considered excellent, .63 (40% overlapping variance) very good, .55 (30% overlapping variance) good, .45 (20% overlapping variance) fair, and .32 (10% overlapping variance) poor. Using this framework, items were chosen

Table 2
Principal Factors Extraction with Oblique Rotation

Items	<i>Factor 1</i>	<i>Factor 2</i>
	Interpersonal KSAs	Self-Management KSAs
Team members avoided unnecessary confrontation during the group exercise ^a	.77	-.23
Members took initiative in trying to solve the problem ^a	.65	.14
Individuals in the group gave suggestions ^a	.56	.03
Team members suggested appropriate and attainable goals	.46	.36
Individuals performed tasks quickly and proficiently	.39	.34
Team was constructive, civil, and not personally threatening ^a	.81	-.21
Individuals considered the contributions of all team members ^a	.77	.07
Team members communicated ideas clearly and effectively ^a	.70	.12
Team members attempted to find solutions that satisfied all individuals ^a	.71	.17
Members of the team participated in group decision making ^a	.73	.09
Members shared information and listened carefully to each other ^a	.69	.23
Individuals encouraged other members in achieving the team's goals ^b	.22	.69
All tasks were assigned according to the ability of each team member ^b	-.01	.83
Individuals in the group gave team members feedback on their performance ^b	-.01	.87
Eigenvalue	6.60	1.38
% Variance	47.20	9.90

^aItems included in the Interpersonal KSA scale.

^bItems included in the Self-Management KSA scale.

that were .45 or higher on one of the factors and were .32 or lower on the other factor. A total of 9 items comprised the interpersonal KSA scale, while 3 items comprised the self-management KSA scale. Cronbach's alpha for the interpersonal and self-management KSA scales were .89 and .81, respectively. Composite scores for each group on these two scales was then calculated.

RESULTS

Descriptive Statistics for the Emergent Leaders and Followers

The means and standard deviations for the personality traits of extroversion and openness to experience as well as cognitive ability are reported in Table 3. Each of these constructs are provided for emergent leaders and followers.

Discriminant Function Analysis for Emergent Leader Behaviors and Followers

To examine hypothesis 1, a discriminant function analysis was performed. Evaluation of assumptions of linearity, normality, multicollinearity, and homogeneity of variance-covariance matrices revealed no threat to this type of multivariate analysis. Predictors were cognitive ability and the personality traits of extroversion and openness to experience, while the two groups were emergent leaders and followers. The discriminant function had a $\chi^2(3)$ of 24.02, $p \leq .001$ with a canonical correlation of .28. Wilk's Lambdas Univariate analyses, as seen in Table 3, suggests that the best predictors for distinguishing between emergent leaders and followers were cognitive ability, extroversion, and openness to experience. Emergent leaders scored higher on cognitive ability, extraversion, and openness to experience than the followers.

Multiple Regression Analyses for Emergent Leader Behaviors

For hypotheses 2A and 2B, multiple regressions were performed using the data from emergent leaders to investigate the role of personality and its relationship to team performance and KSAs. Evaluation of the

Table 3
Means and Standard Deviations of Emergent Leaders and Followers
By Personality, and Cognitive Ability

Variables	<i>Emergent Leaders</i>		<i>Followers</i>		Univariate F
	Mean	SD	Mean	SD	
Extroversion	6.49	.98	6.05	1.34	6.73**
Openness to Experience	6.59	1.04	6.28	.94	5.19*
Cognitive Ability	65.26	13.66	57.74	13.11	16.83***

N = 304.
*** $p \leq .001$, ** $p \leq .01$, * $p \leq .05$.

Table 4
Bivariate Correlations of the Emergent Leaders

Predictors	1	2	3	4	5	6	7
1. Extroversion	.85						
2. Conscientiousness	.31*	.78					
3. Openness to Experience	.04	-.05	.71				
4. Cognitive Ability	-.05	.00	.03	.84			
5. Performance	-.11	.25*	.00	.27*	—		
6. Interpersonal KSA	.24 [†]	.10	-.10	-.07	.18	.89	
7. Self-Management KSA	.23 [†]	-.06	-.06	.00	.06	.60***	.81

N = 67 groups.

*** $p \leq .001$, ** $p \leq .01$, * $p \leq .05$, [†] $p \leq .10$.

Internal Consistencies (Cronbach's alpha) provided along the diagonal.

assumptions including normality, linearity, and homoscedasticity of residuals revealed no violations. With a $p \leq .001$ criterion for Mahalanobis distance, there were no outliers among the cases.

Table 4 displays the correlations between personality, cognitive ability, team performance, and KSAs. For the emergent leadership behaviors, cognitive ability and conscientiousness were significantly related to team performance ($r = .27, .25$, respectively). Table 5 shows the multiple regression results of personality on team performance and KSAs. This table displays the standardized regression coefficient (*Beta*), the multiple R, and the coefficient of determination or the amount of variance accounted for by all of the personality traits (R^2) in predicting team performance and KSAs. In analyzing team performance, conscientiousness was the only personality trait predictive of this measure ($\beta = .30$).

Table 5
Multiple Regression Results (β -Weights) of Personality on Team Performance and KSAs

Predictors	Team Performance	Team KSAs	
		Interpersonal	Self-Management
Conscientiousness	.30*	.01	-.16
Extroversion	-.21	.21	.26 [†]
Openness to Experience	.02	-.12	-.09
Multiple R	.32	.29	.30
R^2	.10	.09	.09

N = 67 groups.

*** $p \leq .001$, ** $p \leq .01$, * $p \leq .05$, [†] $p \leq .10$.

Hierarchical Regression Analyses for Emergent Leader Behaviors

For hypotheses 3A and 3B, hierarchical regression was utilized to determine if the addition of personality improved prediction of team performance and KSAs beyond cognitive ability. Evaluation of the assumptions of normality, linearity, and homoscedasticity of residuals showed no violations. Employing a $p \leq .001$ criterion for Mahalanobis distance, there were no outliers among the cases. Moreover, the correlations between cognitive ability and conscientiousness, extroversion, and openness to experience were not significant, thereby indicating that cognitive ability and personality are relatively independent of each other.

Table 6 depicts the hierarchical regression analyses conducted on team performance and KSAs. Similar to multiple regression, these tables display standardized regression coefficient (*Beta*), multiple R, and the coefficient of determination or the amount of variance accounted for by cognitive ability and personality traits (R^2) on teamwork performance and KSAs. However, since the objective is to examine whether personality adds to cognitive ability in predicting these teamwork processes and outcomes, the change in R^2 (ΔR^2) was also calculated between cognitive ability (first step) and personality (second step).

As shown in Table 6, results revealed that cognitive ability of the emergent leader was predictive of effectiveness ($\beta = .27$). In addition to cognitive ability, the personality trait of conscientiousness was also predictive of team performance. However, all of the personality traits together did not significantly improve this association beyond cognitive ability. Results also further indicated that cognitive ability was not a

Table 6
Hierarchical Regression Results of Cognitive Ability and Personality on Team Performance and KSAs

Predictors	Team Performance				Team KSAs					
	Step	β	R^2	ΔR^2	Interpersonal			Self-Management		
					β	R^2	ΔR^2	β	R^2	ΔR^2
Cognitive Ability	1	.27*	.07		.00	.00		.01	.00	
Personality	2			.11			.09			.09
Conscientiousness		.31*			.01			-.17		
Extroversion		-.21			.21			.26 ^t		
Openness to Experience		.00			-.12			-.09		
Total			.18 ^t			.09			.09	

N = 67 groups.

*** $p \leq .001$, ** $p \leq .01$, * $p \leq .05$, ^t $p \leq .10$.

factor in determining any of the team KSAs within the group. For example, cognitive ability did not significantly account for the variance on both of the interpersonal and self-management KSAs. Thus, personality accounted for most the variance on these constructs.

DISCUSSION

It is suggested that work groups occupy a pivotal role in what is described variously as a management transformation (Walton, 1985), paradigm shift (Ketchum, 1984), and corporate renaissance (Kanter, 1983). Therefore, understanding the dynamics of emergent leadership behavior and its relationship to teamwork processes and outcomes is important. This study attempted to uncover the joint function of emergent leader personality and cognitive ability in determining team performance and KSAs. In particular, the focus was on distinguishing emergent leaders from followers, finding those abilities and personalities that were associated with *both* emergent leadership behavior and teamwork effectiveness, and examining the incremental validity of personality in explaining teamwork processes and outcomes.

Results support the notion that there are certain abilities and personalities that describe emergent leader behaviors. Cognitive ability and the personality traits of extroversion and openness to experience distinguished leaders from followers in a simulated group setting. Both the cognitive ability and extroversion findings are congruent with those reported by Lord and his colleagues (1986). They found these abilities and traits to jointly account for 83% of the variance in explaining leadership emergence. Furthermore, additional research (Lord, Foti, & DeVader, 1984; Stein & Heller, 1979) has shown that verbal skills and extroverted personality characteristics are predictors of emergent leadership.

Openness to experience was also found to be a reliable predictor of emergent leadership behavior. This trait is characteristic of individuals who are curious, broad-minded, creative, and imaginative as opposed to those individuals who are unanalytical and possess conventional and narrow ideas. According to Litizinger and Schaefer (1986), leaders should achieve a balance between their analytical reasoning and their insight and spontaneity. Morris and Hackman (1969) posited and found that emergent leaders displayed more initiation of ideas, expressed more opinions, and asked more questions than did members who did not emerge as leaders. Thus, given the task structure of the simulation in this study, these findings are conceptually and empirically congruent with past research.

In analyzing the emergent leaders and their role in determining team performance and KSAs, results indicated that conscientiousness

and cognitive ability of the emergent leader were related to the group's performance. Conscientiousness is descriptive of an individual who is responsible, dependable, persistent, and achievement oriented. It is these sets of characteristics that are discussed by Kirkpatrick and Locke (1991). They contend that achievement, tenacity, and initiative are some of the traits necessary for a leader to be effective and have an influence upon his/her group or organization. Along with conscientiousness, cognitive ability was also predictive of group performance. This is consistent with the research of Heslin (1964) in which he found intelligence to be related to overall group performance. Moreover, according to Bass (1990), individuals with higher levels of cognitive ability are likely to be more task competent and emerge as leaders, regardless of the situation. Thus, in terms of generalizing the role of cognitive ability to perceptions of emergent leadership behavior *and* work group performance, these findings support such a conclusion. That is, cognitive ability may both predict who emerges as the leader and assist in determining the overall effectiveness of the group.

However, although cognitive ability of the leader was an antecedent in overall group performance, it was not a significant predictor of teamwork KSAs. Unlike the measure for teamwork performance, teamwork KSAs were assessed from the group members themselves and their perceptions of how well the group as a whole performed on each teamwork KSA. Both the interpersonal and self-management competencies focus on the distinctive nature of a teamwork setting. The interpersonal areas such as conflict resolution, collaborative problem solving, and communication are necessary in order for the members within a group to react to each other with respect for ideas, emotions, and differing viewpoints. The self-management areas such as performance management and planning and coordinating are essential for the group to progress toward attainable goals. These goals include not only verifying that the task was performed quickly and proficiently, but also verifying that everyone in the group contributed to the completion of the final task. Given the required level of interdependence among members in the group on this type of task, satisfactory mutual adjustments are important and necessitate that the most attention be paid to relationships and continuing cooperation (Keidel, 1984). Consequently, for this type of task, the intellectual ability of the emergent leader was not related to any of the team's interpersonal skills/competencies.

IMPLICATIONS FOR FUTURE RESEARCH

Since cognitive ability and personality are relatively orthogonal to each other, the final research question investigated whether personality

provides additional variance beyond cognitive ability in predicting team performance and KSAs. As mentioned earlier, cognitive ability did not account for the variance in either of the interpersonal or self-management KSAs. Future research should focus on the incremental validity of personality by employing facets of teamwork effectiveness that use multiple measures beyond those used in this study.

Further, research is needed to refine the teamwork KSAs used in this study. The multiple item teamwork scale was based on Stevens and Campion's (1994) theoretically oriented framework. This framework encompasses those KSAs, which are required or made more salient by the distinctive nature of teamwork situations, such as the increased social and interpersonal requirements. It also includes those KSAs that are essential to the completion and execution of specific goals and objective. Although these KSAs would seem critical to the success of a work team, results in this study found both the interpersonal and self-management skills and competencies to be unrelated. Therefore, research should concentrate on refining the teamwork measurement instrument. Further specification should be made for each of the two broad dimensions of teamwork that comprise, on the one hand, interpersonal areas such as communication, conflict resolution, collaborative problem solving, and on the other hand, self-management areas such as planning and coordinating and performance management.

Additional research is also needed to examine the moderating role of the nature of the task, especially when examining emergent leadership behavior and its role in determining team effectiveness. For example, there may be certain traits (i.e., extroversion, dominance) that may be predictive of emergent leader behavior but are not predictive of team performance across all types of tasks. The simulation used in this study is characteristic of what has been termed "multiple-stage problems" (Davis & Restle, 1963). Such problems require that group members work together to arrange various ideas and pieces of information in proper relation to one another before a potentially "correct" sequencing of issues can be identified. This means that the demonstration of "correctness" is not a simple matter. The simulation is not a "eureka" type of problem (Lorge & Solomon, 1955). As Hackman and Morris (1975) argue, a task of this type falls somewhere in between the extremes of conjunctive-disjunctive (Thibaut & Kelly, 1959). Studies have found that performance of a group is as good as that of the most capable member with disjunctive tasks, and no better than the least capable member with conjunctive tasks (Steiner, 1972). Thus, research should consider the relationship of leader abilities and traits to the effective sequencing of member contributions to multiple-stage problems.

Moreover, Stogdill (1948) argued that researchers must take the task situation into account in order to understand the relationship between

personality and leadership. Previous research has been criticized for its failure to adequately specify the effect of personality in the context of specific task situations. Researchers contend this is due to the lack of a satisfactory method for classifying group tasks (Hackman & Morris, 1975). However, Driskell, Hogan, and Salas (1988), using the framework developed by Holland (1985) and McGrath (1984), have classified six task categories: mechanical/technical, intellectual/analytical, imaginative/aesthetic, social, manipulative/persuasive, and logical/precision. Therefore, the performance processes involved in the task should be another consideration in understanding emergent leadership and team performance, KSAs, and satisfaction.

Future research should also concentrate on which of these performance processes and emergent leadership qualities are most critical and salient in the development of a group. Researchers tend to agree that a group's developmental process occurs in identifiable stages (Gersick, 1989). Carew, Parisi-Carew, and Blanchard (1986) found that leaders who were active and assertive and who assisted the group toward task-oriented goals and objectives had favorable results early in the group's development. Conversely, those leaders with a more participative and supportive style had a negative impact on the quality and cohesiveness of the work group in the early development. However, as the groups progressed throughout their developmental stages, it was these participative leader behaviors that resulted in more productivity, satisfaction, and creativity.

This type of task and its derivatives (e.g., *Desert Survival* and *Lost at Sea*) has been used extensively in leadership and management training to investigate both process (Nemiroff & King, 1975) and structural interventions (Gilmartin, 1974). Although this research was able to identify relationships among abilities and personality on performance, it would be ideal to study different types of groups in a work environment. Studies of temporal sequences in actual, intact work groups can determine which leadership predictors relate to team development and effectiveness. For instance, the task requirements of newly formed teams and organizations are different from those of mature teams and organizations. What is needed of group leaders at different stages of development and different levels of maturity may be different. Future research should examine the role of leadership and work teams in their natural contexts at multiple points in time.

This study has a number of implications for an organizational context. With better understanding of both the antecedents of emergent leadership behavior, organizations can adopt strategies that are specifically aimed at finding individuals who display certain types of personalities and abilities. These strategies include the use of selection procedures to screen individuals whose personalities and competencies are related to emergent leadership behavior and teamwork effectiveness. Organizational interventions

can be employed to identify existing employees who would be most effective in leading a team given their ability and personality. Finally, as more organizations change to a team environment, teamwork measures similar to the ones used in this study will be necessary tools to monitor and evaluate effective group performance.

It is argued that it is usually the leader who plays an integral part in modeling teamwork and setting priorities for team members to successfully engage in teamwork tasks and processes, including those activities that strengthen the quality of the functional relationships, cooperation, communication, and coordination of team members (Guzzo & Salas, 1995). Future investigations should adopt an interactionist perspective at the leader and task level that would be able to assess the function of personality and cognitive ability in predicting team performance, and KSAs in a variety of work simulations and settings.

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